OCT 1 6 2002 SEQ

SEQUENCE LISTING

<110> The Scripps Research Institute Barbas, Carlos Stege, Justin Guan, Xueni Dalmia, Bipin <120> Methods and compositions to modulate expression in plants <130> 27801-20014.20 <140> 09/765,555 <141> 2001-01-19 <150> 09/620,897 <151> 2000-07-21 <150> US 60/177,468 <151> 2000-01-21 <160> 75 <170> FastSEQ for Windows Version 4.0 <210> 1 <211> 532 <212> DNA <213> Artificial Sequence <220> <223> Promoter CsVMV <400> 1 tctagaaact agcttccaga aggtaattat ccaagatgta gcatcaagaa tccaatgttt 60 acgggaaaaa ctatggaagt attatgtgag ctcagcaaga agcagatcaa tatgcggcac 120 atatgcaacc tatgttcaaa aatgaagaat gtacagatac aagatcctat actgccagaa 180 tacgaagaag aatacgtaga aattgaaaaa gaagaaccag gcgaagaaaa gaatcttgaa 240 gacgtaagca ctgacgacaa caatgaaaag aagaagataa ggtcggtgat tgtgaaagag 300 acatagagga cacatgtaag gtggaaaatg taagggcgga aagtaacctt atcacaaagg 360 aatcttatcc cccactactt atccttttat atttttccgt gtcatttttg cccttgagtt 420 ttcctatata aggaaccaag ttcggcattt gtgaaaacaa gaaaaaattt ggtgtaagct 480 attttctttg aagtactgag gatacaactt cagagaaatt tgtaagtttg ta 532 <210> 2 <211> 18 <212> DNA <213> Artificial Sequence <220> <223> Zinc finger protein 2C7 binding site

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ccgtttacct gggatgccgt acgttacaac ggcaagctga ttgcttaccc gatcgctgtt
                                                                      1860
                                                                      1920
gaagcgttat cgctgattta taacaaagat ctgctgccga acccgccaaa aacctgggaa
gagatcccgg cgctggataa agaactgaaa gcgaaaggta agagcgcgct gatgttcaac
                                                                      1980
                                                                      2040
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tatgaaaacg qcaagtacga cattaaagac gtgggcgtgg ataacgctgg cgcgaaagcg
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ggtctgacct tcctggttga cctgattaaa aacaaacaca tgaatgcaga caccgattac
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aagggtcaac catccaaacc gttcgttggc gtgctgagcg caggtattaa cgccgccagt
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ccgaacaaag agctggcaaa agagttcctc gaaaactatc tgctgactga tgaaggtctg
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gaagcggtta ataaagacaa accgctgggt gccgtagcgc tgaagtctta cgaggaagag
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2520
ttggcgaaag atccacgtat tgccgccacc atggaaaacg cccagaaagg tgaaatcatg
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gccagcggtc gtcagactgt cgatgaagcc ctgaaagacg cgcagactaa ttcgagctcg
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cagcgtaccc acacgggtga aaaaccgtat aaatgcccag agtgcggcaa atcttttagc
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                                                                      3240
ccaqaatgtg gcaagtcttt ctctcggtct gacaatctcg tccggcacca acgtactcac
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<210> 16 <211> 3300

<212> DNA

<213> Artificial Sequence

<220>

<223> PArtial sequence of pMal-m3 and zinc finger protein ZFPm3

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| gagatcccgg | cgctggataa | agaactgaaa | gcgaaaggta | agagcgcgct | gatgttcaac | 1980 |
|------------|------------|------------|------------|------------|------------|------|
| | cgtacttcac | | | | | 2040 |
| | gcaagtacga | | | | | 2100 |
| ggtctgacct | tcctggttga | cctgattaaa | aacaaacaca | tgaatgcaga | caccgattac | 2160 |
| | aagctgcctt | | | | | 2220 |
| gcatggtcca | acatcgacac | cagcaaagtg | aattatggtg | taacggtact | gccgaccttc | 2280 |
| aagggtcaac | catccaaacc | gttcgttggc | gtgctgagcg | caggtattaa | cgccgccagt | 2340 |
| ccgaacaaag | agctggcaaa | agagttcctc | gaaaactatc | tgctgactga | tgaaggtctg | 2400 |
| gaagcggtta | ataaagacaa | accgctgggt | gccgtagcgc | tgaagtctta | cgaggaagag | 2460 |
| ttggcgaaag | atccacgtat | tgccgccacc | atggaaaacg | cccagaaagg | tgaaatcatg | 2520 |
| | cgcagatgtc | | | | | 2580 |
| gccagcggtc | gtcagactgt | cgatgaagcc | ctgaaagacg | cgcagactaa | ttcgagctcg | 2640 |
| | acaataacaa | | | | | 2700 |
| | cctctgtggc | | | | | 2760 |
| ccggaatgtg | gtaagtcctt | cagcgatcct | ggccacctgg | ttcgccacca | gcgtacccac | 2820 |
| | aaccgtataa | | | | | 2880 |
| ctggtgcgcc | atcaacgcac | tcatactggc | gagaagccat | acaaatgtcc | agaatgtggc | 2940 |
| | gccagagctc | | | | | 3000 |
| ccctatgctt | gtccggaatg | tggtaagtcc | ttcagccaga | gcagctccct | ggtgcgccac | 3060 |
| | acacgggtga | | | | | 3120 |
| | accttgctcg | | | | | 3180 |
| ccagaatgtg | gcaagtcttt | ctcccaatcc | agccatctcg | tccggcacca | acgtactcac | 3240 |
| accggtaaaa | aaactagtgg | ccaggccggc | cagtacccgt | acgacgttcc | ggactacgct | 3300 |
| | | | | | | |

<210> 17 <211> 3300

<212> DNA

<213> Artificial Sequence

<220>

<223> Partial sequence of pMal-m4 and zinc finger
 protein ZFPm4

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| ctggcaaata | ttctgaaatg | agctgttgac | aattaatcat | cggctcgtat | aatgtgtgga | 1440 |
|------------|------------|------------|------------|------------|------------|------|
| attgtgagcg | gataacaatt | tcacacagga | aacagccagt | ccgtttaggt | gttttcacga | 1500 |
| | aacaaggacc | | | | | 1560 |
| | ataaaggcta | | | | | 1620 |
| | aagtcaccgt | | | | | 1680 |
| | gcgatggccc | | | | | 1740 |
| | gcctgttggc | | | | | 1800 |
| | gggatgccgt | | | | | 1860 |
| | cgctgattta | | | | | 1920 |
| | cgctggataa | | | | | 1980 |
| | cgtacttcac | | | | | 2040 |
| | gcaagtacga | | | | | 2100 |
| | tcctggttga | | | | | 2160 |
| | aagctgcctt | | | | | 2220 |
| | acatcgacac | | | | | 2280 |
| | catccaaacc | | | | | 2340 |
| | agctggcaaa | | | | | 2400 |
| | ataaagacaa | | | | | 2460 |
| | atccacgtat | | | | | 2520 |
| | cgcagatgtc | | | | | 2580 |
| | gtcagactgt | | | | | 2640 |
| | acaataacaa | | | | | 2700 |
| ggatcctctt | cctctgtggc | ccaggcggcc | ctcgagcccg | gggagaagcc | ctatgcttgt | 2760 |
| ccggaatgtg | gtaagtcctt | cagccagagc | agctccctgg | tgcgccacca | gcgtacccac | 2820 |
| acgggtgaaa | aaccgtataa | atgcccagag | tgcggcaaat | cttttagcca | gagcagcagc | 2880 |
| | atcaacgcac | | | | | 2940 |
| | gtgattgtcg | | | | | 3000 |
| | gtccggaatg | | | | | 3060 |
| cagcgtaccc | acacgggtga | aaaaccgtat | aaatgcccag | agtgcggcaa | atcttttagc | 3120 |
| cgcagcgata | acctggtgcg | ccatcaacgc | actcatactg | gcgagaagcc | atacaaatgt | 3180 |
| | gcaagtcttt | | | | | 3240 |
| | aaactagtgg | | | | | 3300 |
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| <210> 18 | | | | | | |
| <211> 3300 | | | | | | |

<211> 3300

<220>

<223> Parial sequence of pMal-Ap3 and zinc finger
 protein ZFPAp3

<400> 18

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                                                                       180
gtgtctctta tcagaccgtt tcccgcgtgg tgaaccaggc cagccacgtt tctgcgaaaa
cgcgggaaaa agtggaagcg gcgatggcgg agctgaatta cattcccaac cgcgtggcac
                                                                       240
                                                                       300
aacaactggc gggcaaacag tcgttgctga ttggcgttgc cacctccagt ctggccctgc
                                                                       360
acgcgccgtc gcaaattgtc gcggcgatta aatctcgcgc cgatcaactg ggtgccagcg
                                                                       420
tggtggtgtc gatggtagaa cgaagcggcg tcgaagcctg taaagcggcg gtgcacaatc
                                                                       480
ttctcgcgca acgcgtcagt gggctgatca ttaactatcc gctggatgac caggatgcca
                                                                       540
ttgctgtgga agctgcctgc actaatgttc cggcgttatt tcttgatgtc tctgaccaga
                                                                       600
cacccatcaa cagtattatt ttctcccatg aagacggtac gcgactgggc gtggagcatc
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tggtcgcatt gggtcaccag caaatcgcgc tgttagcggg cccattaagt tctgtctcgg
                                                                       720
egegtetgeg tetggetgge tggcataaat ateteacteg caateaaatt cageegatag
                                                                       780
cggaacggga aggcgactgg agtgccatgt ccggttttca acaaaccatg caaatgctga
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atgagggcat cgttcccact gcgatgctgg ttgccaacga tcagatggcg ctgggcgcaa
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<212> DNA

<213> Artificial Sequence

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                                                                       960
gcctgctggg gcaaaccagc gtggaccgct tgctgcaact ctctcagggc caggcggtga
                                                                      1020
                                                                      1080
aqqqcaatca qctqttqccc qtctcactgg tgaaaagaaa aaccaccctg gcgcccaata
                                                                      1140
cgcaaaccgc ctctccccgc gcgttggccg attcattaat gcagctggca cgacaggttt
cccgactgga aagcgggcag tgagcgcaac gcaattaatg tgagttagct cactcattag
                                                                      1200
                                                                      1260
qcacaattct catqtttqac agcttatcat cgactgcacg gtgcaccaat gcttctggcg
                                                                      1320
tcaggcagcc atcggaagct gtggtatggc tgtgcaggtc gtaaatcact gcataattcg
                                                                      1380
tqtcqctcaa qqcqcactcc cqttctqqat aatqtttttt qcqccqacat cataacqqtt
ctggcaaata ttctgaaatg agctgttgac aattaatcat cggctcgtat aatgtgtgga
                                                                      1440
attgtgagcg gataacaatt tcacacagga aacagccagt ccgtttaggt gttttcacga
                                                                      1500
                                                                      1560
qcacttcacc aacaaggacc atagattatg aaaactgaag aaggtaaact ggtaatctgg
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attaacqqcq ataaaqqcta taacqqtctc qctgaaqtcg gtaagaaatt cgagaaagat
accggaatta aagtcaccgt tgagcatccg gataaactgg aagagaaatt cccacaggtt
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qcqqcaactq qcqatqqccc tgacattatc ttctgggcac acgaccgctt tggtggctac
                                                                      1800
qctcaatctq qcctqttqqc tqaaatcacc ccggacaaag cgttccagga caagctgtat
                                                                      1860
ccgtttacct gggatgccgt acgttacaac ggcaagctga ttgcttaccc gatcgctgtt
                                                                      1920
qaaqcqttat cqctqattta taacaaaqat ctqctqccqa acccgccaaa aacctgggaa
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gagatcccgg cgctggataa agaactgaaa gcgaaaggta agagcgcgct gatgttcaac
ctgcaagaac cgtacttcac ctggccgctg attgctgctg acgggggtta tgcgttcaag
                                                                      2040
tatgaaaacg gcaagtacga cattaaagac gtgggcgtgg ataacgctgg cgcgaaagcg
                                                                      2100
qqtctqacct tcctqqttga cctgattaaa aacaaacaca tgaatgcaga caccgattac
                                                                      2160
tccatcgcag aagctgcctt taataaaggc gaaacagcga tgaccatcaa cggcccgtgg
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gcatggtcca acatcgacac cagcaaagtg aattatggtg taacggtact gccgaccttc
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                                                                      2340
aaqqqtcaac catccaaacc gttcgttggc gtgctgagcg caggtattaa cgccqccagt
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ccgaacaaag agctggcaaa agagttcctc gaaaactatc tgctgactga tgaaggtctg
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gaagcggtta ataaagacaa accgctgggt gccgtagcgc tgaagtctta cgaggaagag
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gccagcggtc gtcagactgt cgatgaagcc ctgaaagacg cgcagactaa ttcgagctcg
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                                                                      2820
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ctggtgcgcc atcaacgcac tcatactggc gagaagccat acaaatgtcc agaatgtggc
                                                                      2940
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ccctatqctt qtccqqaatg tggtaagtcc ttcagcacca gtggctcctt ggttagacac
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cagcgtaccc acacgggtga aaaaccgtat aaatgcccag agtgcggcaa atcttttagc
                                                                      3120
cagegegece acetggaacg ceateaacge acteatactg gegagaagee atacaaatgt
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                                                                      3240
ccagaatgtg gcaagtcttt ctcaacttca ggcaacttgg tccgtcacca acgtactcac
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<223> Oligo m12
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<213> Artificial Sequence

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| <210> 2 <211> 5 <212> 1 <213> A | 52 | |
| <220>. <223> 0 | Dligo Ap3 | |
| <400> 2 ggttact | | 2 |
| <210> 2 <211> 5 <212> E <213> F | 50 | |
| <220> <223> C | Dligo NRI-1 | |
| <400> 2 ggttcta | | 0 |
| <210> 2 <211> 5 <212> D <213> A | 0 | |
| <220> <223> C | Dligo NRI-2 | |
| <400> 2 ggtgcgg | cga ctgcagcagc gggttttccc gctgctgcag tcgccgcacc 5 | 0 |
| <210> 2 <211> 5 <212> D <213> A | 0 | |
| <220> <223> 0 | ligo hHD-I | |
| <400> 2 ggggccc | 4 cgc ctccgccggc gggttttccc gccggcggag gcggggcccc 5 | 0 |
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| <220> <223> 0 | Oligo hHD-II | |
|------------------------------------------|--------------------------------------------------------|----|
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| <220> <223> 0 | Oligo c5pl-g | |
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| <220> <223> (| Oligo c5p3-g | |
| <400> 2 ggctctq | | 50 |
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| <220> <223> 0 | Oligo B3c2 | |
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| <220> <223> | Oligo e2c-g | |
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| <210> 3 <211> 3 <212> 4 <213> 4 | 19 | |
| <220> <223> 1 | Primer Ap3-F | |

| <400> 30 ggcgagaggg aagatccag | 19 |
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| <220> <223> Primer NZlib5' | |
| <400> 31 ggcccaggcg gccctcgagc | 20 |
| <210> 32 <211> 44 <212> DNA <213> Artificial Sequence | |
| <220> <223> Primer Ap3f4-R | |
| <400> 32 ctcctctaat acgactcact atagggacac tcacctagcc tctg | 44 |
| <210> 33 <211> 21 <212> DNA <213> Artificial Sequence | |
| <220> <223> Primer m4f3 | |
| <400> 33 cctcgcaaga tcacgacaat c | 21 |
| <210> 34 <211> 27 <212> DNA <213> Artificial Sequence | |
| <220> <223> PCR probe for AP3 | |
| <400> 34 ccatttcatc ctcaagacga cgcagct | 27 |
| <210> 35 <211> 22 <212> DNA <213> Artificial Sequence | |
| <220> <223> PCR primer for AP3 (forward) | |
| <400> 35 | |

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| Thr His Thr Gly Glu Lys Pro Tyr Lys Cys Pro Glu Cys Gly Lys Ser 35 40 45 | | | | | |
| Phe Ser Gln Arg Ala His Leu Glu Arg His Gln Arg Thr His Thr Gly 50 55 60 | | | | | |
| Glu Lys Pro Tyr Lys Cys Pro Glu Cys Gly Lys Ser Phe Ser Gln Ser | | | | | |
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| Ala Cys Pro Glu Cys Gly Lys Ser Phe Ser Arg Ser Asp Asn Leu Val | | | | | |
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| Cys Gly Lys Ser Phe Ser Arg Ser Asp Asn Leu Val Arg His Gln Arg 130 135 140 | | | | | |
| Thr His Thr Gly Glu Lys Pro Tyr Lys Cys Pro Glu Cys Gly Lys Ser | | | | | |
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Arg His Gln Arg Thr His Thr Gly Glu Lys Pro Tyr Lys Cys Pro Glu 120

Cys Gly Lys Ser Phe Ser Arg Ser Asp Asn Leu Val Arg His Gln Arg

Thr His Thr Gly Glu Lys Pro Tyr Lys Cys Pro Glu Cys Gly Lys Ser

Phe Ser Gln Ala Gly His Leu Ala Ser His Gln Arg Thr His Thr Gly

135

150

165

Lys Lys Thr Ser Gly Gln Ala Gly 180

125

140

155

170